General Questions

1. Objectives - How will the impact of specific sources for which there are no empirical data be evaluated? [With a few exceptions, sources are presently lumped as "external sources.] "Back calculation" is one approach indicated. [This is the only approach identified at the moment.] Can you explain more about how this approach will be applied? [The model would be used to identify those segments where concentrations cannot otherwise be explained by upstream loads, currently known sources, or transfers within the harbor. Additional non-model work would be required to tease out specific sources within this "external load."] Will other approaches also be employed? [Maybe.] How will unquantified sources be dealt with in the mass balance model? [The model isn't capable of identifying or quantifying specific sources. Additional work will be required to accomplish this.] Are "back calculations" intended to provide indication of the relative magnitude of various sources (e.g., groundwater, bank erosion, stormwater, etc.)? [No. They are only intended to identify segments where there may be as yet unrecognized sources.]

2. Objectives – Is this model intended to help set cleanup levels? [EPA has suggested that it could be used for this purpose.] If so, please clarify how it will be used for this purpose. [One approach would be to compare model results from various combinations of sediment and water concentrations (i.e., model iterations) to acceptable tissue levels.] This would seem like a risk objective which is not indicated as a focus of the model. [This potential use came about recently and was not one of the model's originally intended uses.]

3. Specifications – Transparency is a pretty logical idea on the face of it and so are some of the others. What is the need for the specified linkage, since that is less apparent? [The food web model shares a number of key parameters in common with the transport and fate model (e.g., water temperature, suspended sediment concentrations, temperature adjusted Henry's Law constants, etc.). It is critical that these move in concert as the harbor undergoes seasonal changes. It is also important to see the responses of sediment, water , and fish tissue concentrations that are correctly aligned in space and time. It seems much easier to accomplish these necessary correspondences with a linked model rather than with a number of independent (and potentially out-of-sync) models.]

4. Conceptual Design – The Arnot and Gobas model has been altered to be time varying through the addition of time steps. This is then linked to the dynamic fate and transport model. Why is the approach preferred to, for example, using a decay function to calculate time for tissue to reach steady state after remediation? [A decay function is not mechanistic, assumes a constant loss and is thus not responsive to non-linear interacting changes in various biotic and abiotic compartments. It is easy to show, for example, that not all receptors respond at the same time or in the same amount to changes in their exposure levels. This might require looking at different decay functions for different compartments of the system.]

5. Model Domain – Explain the process used to identify the proposed model river sections. [The current segmentation was developed by Rene Fuentes, Jean Lee, and Eric Blishke.] What existing empirical data from the site was reviewed/considered? [After a couple of iterations, the segments were assigned roughly on the basis of what is currently known about

depositional and erosional behavior in the harbor.] To what extent do the compartments need to reflect known physical aspects of transport? [The T&F model is designed so that each segment can be parameterized separately. However, all segments are currently parameterized with either default values or those from the Windward reports. It is anticipated that existing or new data could be used to refine this parameterization on a segment by segment basis.]

6. Conceptual Site Model (CSM) – Except in the context of specific parameters, there is no presentation of an overall CSM for the site that attempts to identify (either narratively or graphically) all the processes that may be important in the movement of contaminants in the system. Please explain how data needs to for initial set-up can be defined and how the model results will be used in combination with empirical data to identify future data needs and/or refine the CSM. [We believe, based on the experience of others who have used models of this type in a variety of aquatic environments, that the current model is capable of estimating the distribution and fate of chemicals within the harbor with sufficient resolution for the purposes of comparing remedial and source control alternatives. We would, however, expect to enhance and refine this model with specific pieces of information emanating from other modeling efforts (e.g., sediment hydrodynamics, etc.). As noted in Question 1, additional non-model work would be required to tease out specific sources which are lumped here as "external loads." Conceptually, however, it might be valuable to consider "all the processes" alluded to in this question in terms of their ability to affect a major river system - a triage so to speak of how many of these processes could meaningfully impact such a large and varying natural system. Are they really all likely to be similarly important?]

7. Explain how simplifying assumptions may impact the ability to meet stated objectives at needed level of certainty? Examples include: values for flow to Multnomah Channel, flow apportionment in general, the selection of cells relative to known physical transport processes (e.g., eddies), cross exchange values, information on sources, function of sediment mixed layer under erosional conditions. [The current model is intended to give managers a broad understanding, with some level of confidence (or, conversely, uncertainty), of how chemical levels may change in the harbor over time in response to the decisions they could make. Managers and decision makers will have to weigh-in on how much confidence they need (or uncertainty they are willing to accept). However, it is important to note that adding more parameters to a model or more models to a modelling system does not necessarily reduce uncertainty.]

8. Food Web Structure – Why does the opening caution on complexity of the model as it relates to data availability not apply to the physical model? [Cautions about data availability should apply to both sub-models, as well as to any models for a system of this size.]

9. Do you propose eventually automating the linkage between the two models in the future? [Yes, if we decide to proceed with this modelling effort. STELLA (v9) has an enhanced DDE capability.]

10. Figure F1-3 - What is the "external load" from deep sediment to mixed sediment? [This is to allow for inclusion of net erosion at some later time if so desired.]

11. Specific Inputs – In general it is hard to determine (1) in some cases how data were used to derive inputs even for the test runs and (2) in most cases how inputs would be derived from site data beyond the points of departure noted for the test run. The use of the data to derive model inputs will need substantial discussion if this model is to be used and to determine exact Round 3 data needs. [All data used in the models are summarized in Appendix D. However, a more expansive version of this appendix has been prepared and will be available to the May 2nd meeting. With the exception of a few default values taken from Davis, values for the example runs were taken from the Windward report. The parameters requiring data seem to be common to many types of transport and fate models. It is hard to see how any modeling effort could proceed without either default or site-specific values for these typically encountered parameters. That there are only about 12 parameters across both models that are "sensitive" should help focus the data needs discussion.]

12. How will empirical and modeled information be resolved? For example, what if sediment trap data indicates the flux to the sediment bed in a downstream segment is much different from what is modeled? Or surface water concentrations actually measured are different? etc. [The actual flux value could be incorporated into these models. In general, we would anticipate revising the model as needed to affect a better alignment between modeled and empirical results, when such empirical results are available.]

13. Calibration and Validation – Per question 11, in general these aspects of modeling are not discussed. What is the proposed approach for this? Sections for sensitivity and uncertainty are shown, which is good. What's the approach for these evaluations? [We are still in the process of re-arranging available data by segment in anticipation of a first calibration run for these models. See also answer to Question 7.]

14. How will the greater exposure areas of larger home range fish be accounted for with the proposed food web model segments? [By accumulating exposure over the number of segments a larger home range fish is thought or known to traverse.]

15. How will fluctuations in dietary preferences (as described in section 1.2.2.1) be accounted for in the food web model? [We would define a "menu" of possible food items and assign a distribution of probabilities to each item. Probabilities would then be selected at random (one reason for including an MC capability), normalized to one, and the normalized result used as the dietary fraction. This is a simpler but similar approach to that used by U.S. EPA for their 3MRA model.]

16. How would performance objectives (in terms of predictive capability) be different for the time varying food web model described here as compared to a food web model to be used for risk applications? Would performance objectives vary by chemical? [We're very interested in knowing when a sediment, water, or tissue level might be reached, what levels might be in different locations or receptors at the same point in the future, and, comparatively, how different remedial alternatives (or combinations thereof) might affect these levels.